Identifying and Estimating Oral Health Disparities Among U.S. Adults

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Abstract

Background: Healthy People 2010 Oral Health Objectives direct attention to the need for systematic data on disparities in oral health. In response, NIDCR researchers have been analyzing NHANES III data bearing on this theme. This presentation will focus on the lessons learned to date with regard to disparities among adults. **Approach:** The following aspects of oral health among persons 18 years and over have been the primary focus of attention: edentulism, untreated coronal and root decay, gingivitis, loss of attachment of 4+mm, the presence of tooth conditions involving pulpal pathology and retained roots, and recent use of dental services. Specific topics studied include disparities across gender, age, racial, racial-ethnic, educational, family economic status, and broader socioeconomic status categories of the adult population. Both contingency table and logistic analyses have been carried out using weighted data, statistical analyses appropriate to NHANES III's complex design, and models adjusting for potential sociodemographic confounders as well as a recent dental visit. **Lessons Learned:** The presentation will focus on: (1) the major empirical generalizations about disparities in adult oral health for which these NHANES III analyses provide evidence, (2) major methodological lessons, and (3) identified further research that needs to be carried out.

Introduction

The HP2010 objectives direct attention to the identification and elimination of oral health disparities across the lifespan. This presentation focuses on disparities in oral health amo ng U.S. adults.

Objective

The overall objective of the presentation is to summarize what NIDCR policy analysts have so far learned about inequalities in adult oral health:

1) With respect to overall gender, racial, racial ethnic, and socioeconomic status (SES) disparities, and

2) With regard to the extent to which any of these descriptive differences are explainable in terms of key aspects of the demographic and social composition of the population, as well as variations in the recent use of dental services.

Scope

The presentation focuses on selected indicators of unmet oral health needs (UOHNs) and the utilization of dental services among U.S. adults.

UOHNs are defined in terms of the presence of any oral diseases, disorders, or conditions that might benefit from treatment.

Utilization of Dental Services is defined by whether or not a person has actually visited a dentist or dental hygienist in the past 12 months.

U.S. Adults for the most part refers to dentate persons 18 years and over in the civilian, noninstitutionalized population. In the analyses of certain aspects of restorations and tooth conditions (RTCs), only dentate adults 18-74 years were analyzed. Analyses of edentulism were limited to all adults 25+ years in one instance, and to persons 35+ years in another. Analyses of gender disparities generally focused on dentate persons 18-74 years.

Methods

Source of Data

NHANES III

Study Populations

- 13,800+ persons 25 years and over
- 10,500+ persons 35 years and over
- 14,290+ dentate persons 18 years and over
- 13,370+ dentate persons 18-74 years

Data Collection

Clinical parameters of oral health were obtained through visual-tactile oral examinations conducted in mobile examination centers by dentists who were trained and calibrated to apply standardized criteria in field settings. Information on demographic and social backgrounds, as well as on visiting a dentist in the past 12 months, was obtained by trained interviewers using a structured questionnaire, a week or two before the examinee's clinical examination.

Selected Variables Used in Analyses and Their Definition

Edentulism: Person is missing all of his or her natural teeth.
Untreated Coronal Decay: Person has 1+ tooth crowns with untreated decay.
Untreated Root Decay: Person has 1+ tooth roots with untreated decay.
Untreated Dental Decay: Person has either untreated coronal decay or untreated root decay, or both.
Gingivitis: Person has 1+ bleeding gingival sites.
Gingival Recession: Person has 1+ sites with 1+ mm of recession of the gums.

Loss of Attachment 4+mm: Person has 1+ periodontal sites with loss of attachment ≥ 4mm.
Advanced Loss of Attachment: Person has at least one site with 6+mm of loss of attachment or at least 2 sites with loss of attachment ≥ 4mm.
Restorations and Tooth Conditions (RTCs): Person has one or more RTCs that might benefit from treatment.
RTC Involving Pulpal Pathology or A Retained Root: Person has 1+ of these tooth conditions that might benefit from treatment.
Recent Dental Visit: Person visited a dentist or dental hygienist in the past 12 months.
Socioeconomic Status (SES): A classification of a person into one of four categories based on their overall score derived from two seven-point scorings for individual educational attainment and annual family income relative to the official poverty threshold.

Data Analyses

- Weighted data
- Using SUDAAN software (PROC DESCRIPT and PROC LOGISTIC)
- Estimation of Disparities
  - Unadjusted Odds Ratios (Women vs. Men; Blacks vs. Whites; Mexican-Americans vs. White non-Hispanics; and persons in lower, lower middle and upper middle socioeconomic status categories vs. persons in the higher SES category).
  - Adjusted Odds Ratios (Each of the above odds ratios also were estimated in models including age, gender, race or race-ethnicity, education and annual family income, or a composite measure of socioeconomic status, and a recent dental visit).
- Tests for two-way interactions were carried out in each set of analyses but are not shown due to lack of space (*See selected handouts for some of the more notable two-way interactions*).
- An alpha level ≤ 0.01 was used in evaluating the results of all statistical analyses.
- In the presentation of unadjusted and adjusted odds ratios, values less than 1.0 have been reflected. These reflected odds ratios should be read as so many times less likely than the reference population. The graphics shown in the figures have been annotated when the odds ratios displayed have been reflected.

Results

Gender Disparities

Do Adult Women and Men Differ With Regard to Unmet Oral Health Needs? (Table 1)

- In the United States during 1988-1994, among dentate persons 18-74 years, compared to men,
  - Women were ***less*** likely to have:
    - Untreated Coronal Decay
    - Untreated Root Decay
    - Gingivitis
    - Gingival Recession
    - Advanced Loss of Attachment, and
    - One or ***more*** restorations and tooth conditions involving pulpal pathology or a retained root
  - Women were ***more*** likely to have:
    - Visited a dentist or dental hygienist in the past 12 months
- Among all persons 25-74 years, women and men were ***similar*** with regard to the relative frequency of edentulism

Do Variations in Age, Race-Ethnicity, Education, Family Economic Status, and a Recent Dental Visit Account for Disparities Between Women and Men (Figure 1)?

- Initial findings of overall ***differences*** between women and men *(described above)* were replicated in logistic regression analyses which simultaneously adjusted for the effects of gender, age, race-ethnicity, education, and family economic status.
- Similarly, the initial finding of ***no*** differences in the likelihood of edentulism among women and men was replicated when these same variables were taken into account.
- Adding recent dental care and dental insurance to these logistic analyses also did not account for the observed disparities between women and men with regard to the indicators of unmet oral health needs that were analyzed.

Racial Disparities

Do Black and White Adults Differ With Regard to Unmet Oral Health Needs (Table 2)?

- In the United States during 1988-1994, among dentate persons 18 years and over, compared to Whites:
  - Blacks were ***more*** likely to have:
    - Untreated coronal decay
    - Untreated root decay
    - Untreated dental decay
    - Gingivitis
    - Gingival Recession
    - Advanced loss of attachment, and
    - One or more restorations or tooth conditions involving pulpal pathology or a retained root
  - Blacks were ***less*** likely to have:
    - Visited a dentist or dental hygienist in the past 12 months
- Among all persons 25 years and over, compared to Blacks, Whites were slightly ***more*** likely to be edentulous.

Do Variations in Age, Gender, SES, and a Recent Dental Visit Account for Black/White Disparities (Figure 2)?

- Figure 2 shows results from selected logistic analyses in which race did not interact with any of the other variables in the model.
  - In these models with no significant two-way interactions, odds ratios for each indicator of unmet need exceeded 1.0 even

with adjustment for SES or SES plus a recent dental visit.

Racial-Ethnic Disparities

Do Mexican-American and White Non-Hispanic Adults Differ With Regard to Unmet Oral Health Needs (Table 3)?

- In the United States during 1988-1994, among dentate persons 18 years and over, compared to White non-Hispanics:
  - Mexican Americans were ***more*** likely to have:
    - Untreated coronal decay
    - Untreated root decay
    - Untreated dental decay
    - Gingivitis, and
    - One or more restorations and tooth conditions involving pulpal pathology or a retained root.
  - Mexican-Americans were ***less*** likely to have:
    - Edentulism *(among all persons 35 years and over)*
    - Gingival recession, and
    - Loss of attachment $\geq$ 4mm.
  - Mexican-Americans were ***less*** likely to have:
    - Visited a dentist or dental hygienist in the past 12 months.
- Among dentate persons 18 years and over, Mexican-Americans were ***similar*** to White non-Hispanics with regard to the relative frequency of advanced loss of attachment.

Do Variations in Age, Gender, SES, and a Recent Dental Visit Account for the Mexican-American/White Non-Hispanic Disparities (Figure 3)?

- Some of the observed disparities were accounted for by variations in SES, including the likelihood of having:
  - Untreated coronal decay
    - Untreated root decay, and
    - One or more RTCs involving pulpal pathology or retained roots *(data not shown, see handout)*.
- Disparities related to the likelihood of having gingivitis and of having had a recent dental visit were only partially explained by SES *(Figure 3)*.
  - Even after controlling further for a recent dental visit Mexican-Americans still were 1.5 times more likely to have gingivitis.
- Two-way interactions between racial-ethnic background and age, gender, SES and a recent dental visit exist for some of the oral health variables studied *(See handout)*.

Socioeconomic Status Disparities

Is There an SES Gradient In Unmet Oral Health Needs Among Adults (Table 4)?

- In the United States during 1988-1994, there was an SES gradient among dentate adults 18 years and over in unmet oral health needs, in the sense that the lower the SES, the more likely the unmet oral health needs, as indicated by:
  - Edentulism *(among all persons 25 years and over)*
  - Untreated coronal decay
  - Untreated root decay
  - Gingivitis
  - Loss of attachment of 4+mm
  - One or more RTCs involving pulpal pathology or a retained root.
- During this same time period there also was an SES gradient in the recent utilization of dental services
  - In the sense that the lower the SES, the less likely an individual was to have visited a dentist or dental hygienist in the past 12 months.

Do Variations in Age, Gender, Race-Ethnicity and a Recent Dental Visit Account for the SES Gradients in Unmet Oral Health Needs (Figures 4-6)?

- Even after adjusting for the effects of age, gender and race-ethnicity, among dentate adults, compared to persons in higher SES positions, individuals with lower SES backgrounds were 1.5-2.0 times more likely to have gingivitis and loss of attachment $\geq$ 4mm *(Data not shown, see handout)*.
- For other indicators of unmet oral health needs among the adult dentate population, the disparities between persons with lower and those with higher SES backgrounds were 3-4 times greater.
  - Compared to adults with higher SES backgrounds, individuals with lower SES backgrounds were:
    - 6.1 times ***more*** likely to have untreated coronal decay *(Figure 4)*,
    - 7.2 times ***more*** likely to have untreated root decay *(Figure 5)*, and
    - 7.5 times ***more*** likely to have a restoration or tooth condition involving pulpal pathology or a retained root *(Figure 6)*.
- When age, gender and race-ethnicity were controlled, there were only two indicators *(gingivitis and LOA $\geq$ 4mm)* for which a threshold was reached among persons with upper middle SES backgrounds *(Data not shown, see handout)*.
- There also was an SES gradient in the recent use of dental services *(Figure 7)*.
  - But these latter SES differentials attenuated but did not fully account for SES disparities in unmet oral health needs among adults *(See bottom panels of Figures 4-6)*.

Summary

- In the United States, there are numerous overall disparities in the prevalence of unmet oral health needs among persons 18 years and over.
  - These disparities occur across a broad spectrum of indicators of unmet oral health needs, including:
    - Edentulism
    - Untreated coronal decay
    - Untreated root decay
    - Having one or more tooth conditions involving pulpal pathology or retained roots
    - Gingivitis, and
    - Loss of attachment of 4+mm
- Since each of these types of disparities represent conditions that might be improved by appropriate treatment, it is not surprising that the presence of disparities in unmet oral health needs is paralleled by disparities in the recent use of dental services.
- The largest disparities occur among persons in lower SES positions as contrasted with those in higher SES positions.
  - Disparities among selected racial and racial ethnic categories are the next largest, followed by disparities between men and women.
- Disparities between men and women, Blacks and Whites and between Mexican-Americans and White non-Hispanics, sometimes *(but only slightly)* reflect differences in the age and gender composition of the groups being compared.
- SES and having a recent dental visit only partially explain disparities between men and women and between Blacks and Whites.
- SES and having a recent dental visit explain considerably more of the disparities between Mexican-Americans and White non-Hispanics.
  - But here too, there are several types of disparities which are not fully accounted for by SES and a recent visit to a dentist or dental hygienist.

Discussion

- The above presentation has highlighted disparities in a limited number of indicators of unmet oral health needs for gender, racial, racial-ethnic, and SES categories of U.S. adults while controlling for a limited number of explanatory variables.
- The disparities highlighted in the graphic presentations represent net disparities which were observed after adjusting for the effects of selected demographic and social composition variables, as well as a recent dental visit.
- The results of these analyses may be extended by considering:
  - Other indicators of unmet oral health needs
  - General health disparities
  - Children and adolescents
  - Other comparison groups
  - The kinds of preventive and treatment services actually received
  - Additional explanatory variables, and
  - The characteristics of the communities in which people live.

Conclusions

- Compared to gender, race, and race-ethnicity disparities in unmet oral health needs, among U.S. adults, SES disparities are the largest and the most consistent.
- Nonetheless, SES disparities only account for some of the disparities across gender, racial, and racial-ethnic categories of adults.
- Accordingly, since disparities by gender, race or race-ethnicity, and SES are partially independent of each other, achievement of the HP2010 oral health objectives for adults will require comprehensive and sustained attention both to adequately understand and effectively reduce disparities in unmet oral health needs by gender, race, race-ethnicity and socioeconomic status.

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